

Features

Switching Regulator

- Boost Converter
- Efficiency 93% , >80% With 10% Load
- Input Range Down To 0.65V
- Continuous Short Circuit Protection
- 7µA Input Current In Standby
- -40°C To +100°C Operation
- IEC/EN62368-1 certified, CB Report

Description

The R-78S is a DC/DC boost converter designed to run from single cell batteries. The input voltage range of 0.65V-3.15V means that alkaline, NiCd, NiMH, zinc-carbon or lithium chemistry cells can be used to generate a stable 3.3V output to power microprocessors, WLAN/Bluetooth modules and IoT systems. The very high efficiency and low standby consumption can be used to extend battery lifetimes until the „last gasp“ to get the maximum available energy out of the cell. The wide operating temperature of -40°C to +100°C, short circuit protection, OTP, Class A EMC and 3-year warranty round off this high performance converter.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Max. Output Current [mA]	Efficiency ⁽¹⁾ @ min Vin [%]	Efficiency ⁽¹⁾ @ max. Vin [%]	Max. Capacitive Load ⁽²⁾ [µF]
R-78S3.3-0.1	0.65-3.15	3.3	100	92	93	100

Notes:

Note1: Efficiency is tested by 1.5V input voltage and full load.

Note2: Max. Cap Load is tested by nominal input and full resistive load.

Specifications (measured @ $t_a = 25^\circ\text{C}$, 1.5Vin, full load after warm up unless otherwise stated)

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Minimum Start-up Voltage			0.8VDC	
Input Voltage Range ⁽³⁾	40mA (continuous)	0.65VDC		1.49VDC
	100mA (continuous)	1.5VDC		3.15VDC
No Load Power Consumption			240µW	
Under Voltage Lockout	DC-DC OFF		0.4VDC	
Quiescent Current			160µA	
Start-up time			2ms	
Rise Time			800µs	
Internal Operating Frequency			1200kHz	
Minimum Load			0%	
Dropout Voltage			150mV	
Output Ripple and Noise	20MHz BW		100mVp-p	
ON/OFF CTRL	DC-DC ON DC-DC OFF		Open or $0.7V \leq V_{CTRL} < V_{in}$ Short to GND or $V_{CTRL} < 0.1V$	
Standby Current			7µA	

Notes:

Note3: For more information, please refer to output current vs input voltage graph

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RECOM
DC/DC Converter

R-78S

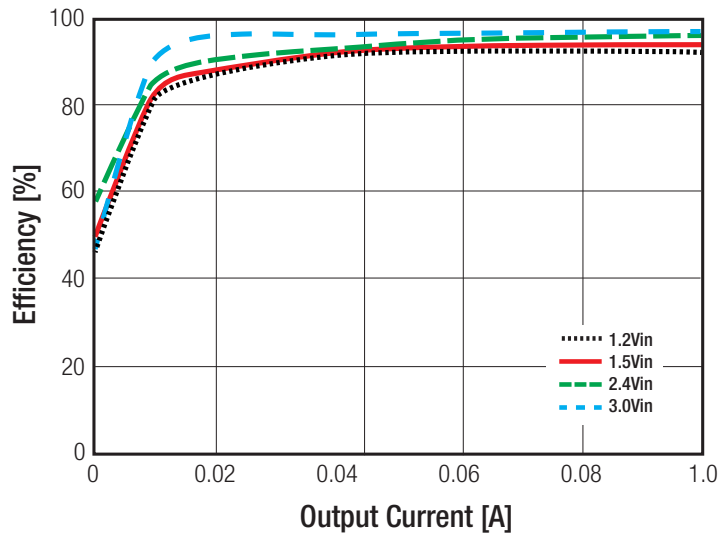
0.1 Amp
SIP4
Single Output



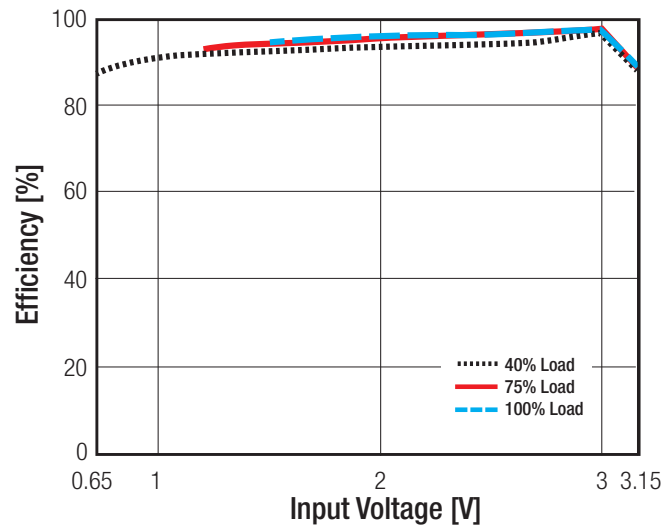
IEC/EN62368-1 certified
CB Report
EN55022 Compliant

Specifications (measured @ $t_a = 25^\circ\text{C}$, 1.5V_{in} , full load after warm up unless otherwise stated)

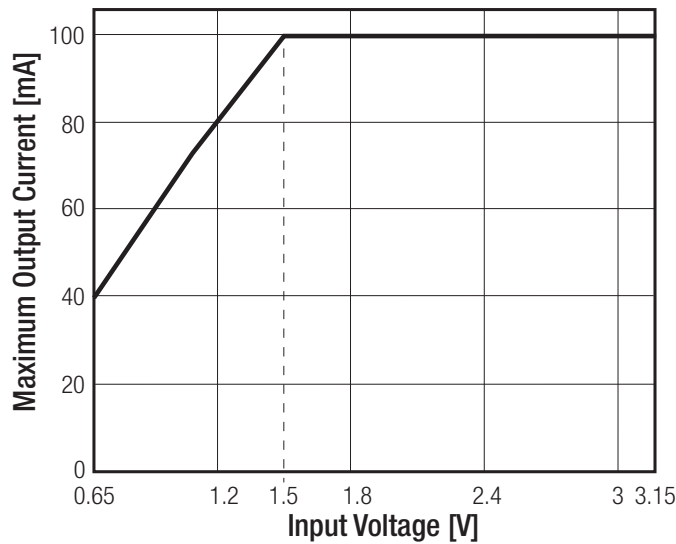
Efficiency vs. Load



Efficiency vs. Input Voltage



Output Current vs. Input Voltage



Specifications (measured @ $t_a = 25^\circ\text{C}$, 1.5V_{in} , full load after warm up unless otherwise stated)

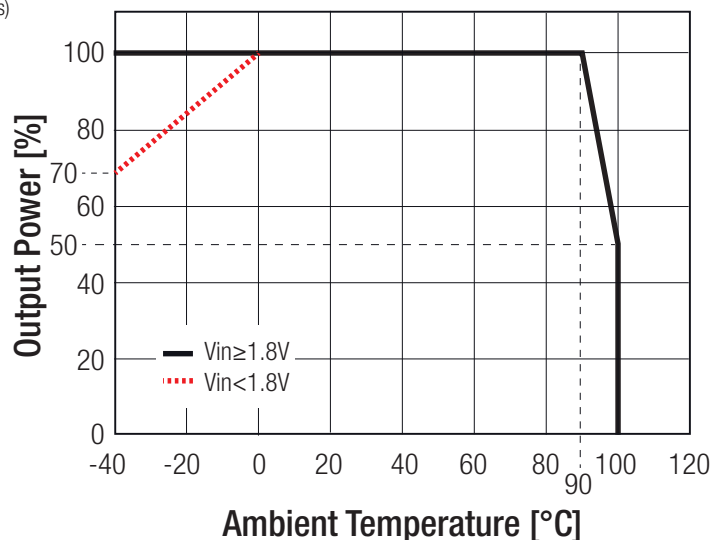
REGULATIONS		
Parameter	Condition	Value
Output Accuracy		$\pm 3.0\%$ typ.
Line Regulation	low line to high line, full load	$\pm 0.3\%$ typ.
Load Regulation	10% to 100% load	$\pm 1.0\%$ typ.

PROTECTIONS		
Parameter	Condition	Value
Short Circuit Protection (SCP)	below $100\text{m}\Omega$	continuous, auto recovery
Over Temperature Protection (OTP)	internal IC	$\geq 150^\circ\text{C}$ $\leq 130^\circ\text{C}$ shutdown restart after cooling down

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range	with derating (see graph)	-40°C to $+100^\circ\text{C}$
Maximum Case Temperature		$+105^\circ\text{C}$
Temperature Coefficient		$0.015\%/^\circ\text{C}$
Operating Altitude		5000m
Operating Humidity	non-condensing	5% to 95% RH
Pollution Degree		PD2
MTBF	according to MIL-HDBK-217F, G.B.	$+25^\circ\text{C}$ $+90^\circ\text{C}$ 78172×10^3 hours 6963×10^3 hours
Vibration		10-55Hz, 2G, 30min along X, Y and Z axis

Derating Graph

(@ Chamber and natural convection 0.1m/s)



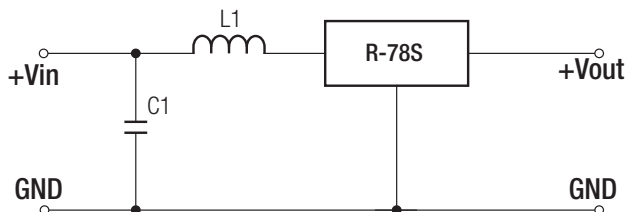
SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report / File Number	Standard
Audio/video, information and communication technology equipment Safety requirements (CB Scheme)	L0339m39-B1-L	IEC62368-1, 2nd Edition, 2014 EN62368-1, 2014
RoHs2+		RoHS 2011/65/EU + AM2015/863

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Specifications (measured @ $t_a = 25^\circ\text{C}$, 1.5Vin, full load after warm up unless otherwise stated)

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	without external components with external components	EN55022, Class A EN55022, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024, 2010
ESD Electrostatic discharge immunity test	Air $\pm 8\text{kV}$ and Contact $\pm 4\text{kV}$	IEC61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3 V/m	IEC61000-4-3, Criteria A
Fast Transient and Burst Immunity	$\pm 0.5\text{kV}$	IEC61000-4-4, Criteria A
Surge Immunity	$\pm 0.5\text{kV}$	IEC61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	3V	IEC61000-4-6, Criteria A
Power Magnetic Field Immunity	50Hz/ 1A/m	IEC61000-4-8, Criteria A

EMC Filtering Suggestions according to EN55022 Class B

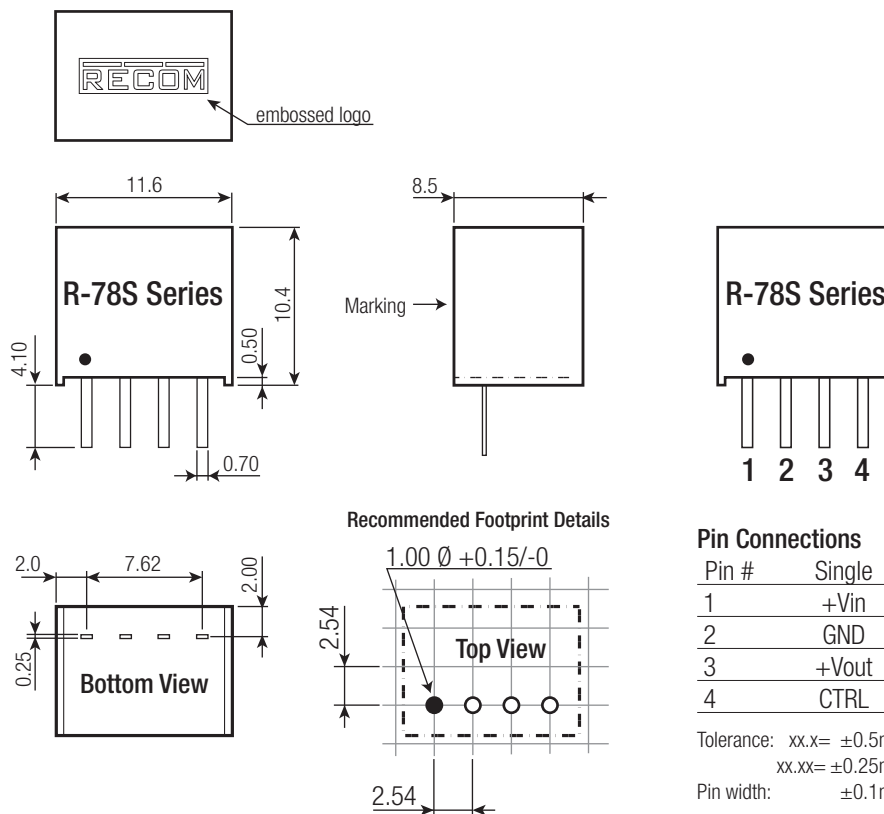


C1	L1
2.2 μF 16V MLCC	1 μH Choke

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case Potting PCB	non-conductive black plastic, (UL94 V-0) epoxy, (UL94 V-0) FR4, (UL94 V-0)
Package Dimension (LxWxH)		11.6 x 8.5 x 10.4mm
Package Weight		2g typ.

Dimension Drawing (mm)



Pin Connections

Pin #	Single
1	+Vin
2	GND
3	+Vout
4	CTRL

Tolerance: xx.x= $\pm 0.5\text{mm}$

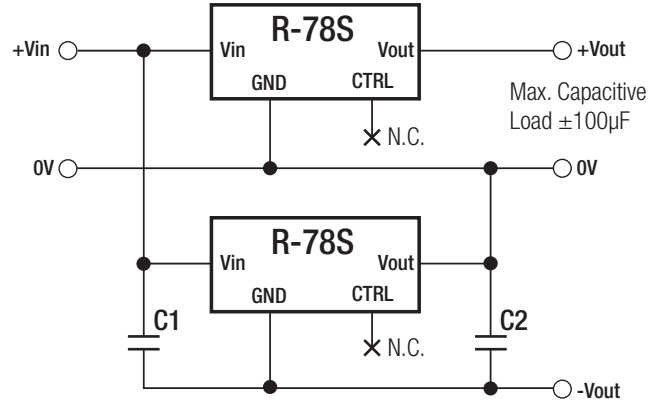
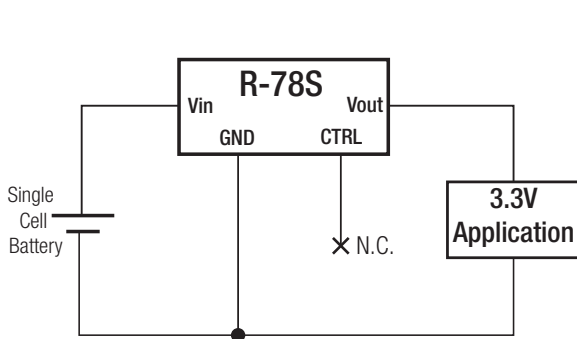
xx.xx= $\pm 0.25\text{mm}$

Pin width: $\pm 0.1\text{mm}$

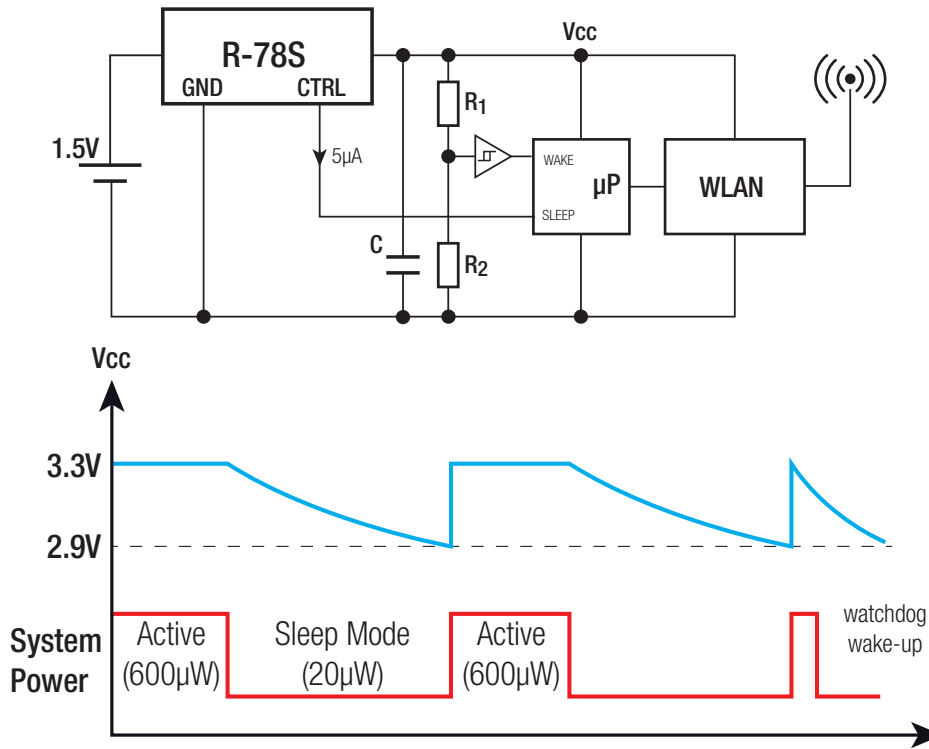
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INSTALLATION AND APPLICATION

Standard Application Circuits



Power-Save Application



PACKAGING INFORMATION		
Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 11.2 x 18.2mm
Packaging Quantity		42pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	5% to 95% RH

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